

9/4/2018

Wednesday, October 10, 2018 9:43 AM

Team Members: Kendall Gray, Eric Smead, Kaleb Cartier

In Attendance: Kendall Gray, Kaleb Cartier, Eric Smead

Recorder for this meeting (will discuss later):

Team name possibilities:

Kendall Gray: (253)797-1699	gray 4747
Eric Smead: (408)540-4331	smea8590
Kaleb Cartier: (208)304-9926	cart5547

Compare schedules:

Kendall Gray:

Will be travelling a lot with golf

Eric Smead:

Mostly class stuff

Kaleb Cartier:

Mostly class stuff

First meeting time: Attempting for Wednesday 9/5/2018 before 1030

Will be Thursday 1100 in the ThinkTank

Need to start doing some research on doing the project before the first meeting with the sponsor

Will be defining extra times to meet once we have all of the Outlook calendars side by side

Kendall will be doing the meeting agendas

Jonathan Richards is our contact from SEL: jonathan_richards@selinc.com

Need to find a time to meet with him before the 9/25/2018

Kendall will be here the 12, 13, 14, 20 and 21

Kendall will email with the time slots possible

This information will be put on the agenda

These meetings generally will last a long time (thinking like a full afternoon)

We will need to make sure to create the team contract by 9/6/2018

9/6/2018

Thursday, September 6, 2018 11:05 AM

In attendance: Kendall Gray, Kaleb Cartier, Eric Smead, Michael Maughan, Matthew Harned

Team name discussion: No new names

Team discussion:

Concerns about researching before going to SEL next Thursday 9/13/2018 meeting in the Gold lot right across from Gauss Johnson

We are trying to figure out what exactly SEL is desiring

What we think is going on is trying to find the COG in all 3 axis while the part is in the server mount

Kendall will be sending out some information on some information from car manufacturers that she had found

Questions that we will need to ask the sponsor:

Timing

Need to make sure that we fully understand what is being asked of us

How often client would like an update

Discuss internally what questions that we want to ask

Do not just focus on one avenue. Start looking at a lot of different options

Dr. Maughan is to keep us on track and to provide technical knowledge, but not to teach us

Matthew is another set of eyes and ears to help, as well as being the shop advisor

Matthew did do his senior design with a sensor project

Dr. Maughan would like access to our files that we share

The better the communication with the client would be a bit more helpful

We need to make sure that we are meeting once a week as a team

Recommendation for taking notes at the client interview

Recording the client interview will need to be asked when we get there

Get to the root of the problem

Needs - the things the product needs to do in the end (fast, quiet, cost less than...)

Ideal and Acceptable

Constraints - hard needs (has to fit in this box...)

Interview Guidelines

Observe things that are unspoken

May watch someone set up the device

Generate questions based on what you see

Confirm things that are said

Clarify priorities

May want to record the conversation for later in case you miss something? - ASK

Value Proposition - what value does this project bring that makes it worth doing

Why would someone want this product over any other similar product?

More reliable products

Quicker calculations

Check out SEL website

Look for government regulations

9/13/2018

Thursday, September 13, 2018 11:02 AM

In attendance: Eric Smead, Kendall Gray, Michael Maughan, Matthew Harned, Kaleb Cartier

Going over the questions that we came up with, and finalizing what questions should really be asked, and how to ask them. Any adjustments will need to be made within the personal Senior Capstone Logbook

We will need to ask about taking pictures and for recording the meeting information.

9/20/2018

Thursday, September 20, 2018 11:05 AM

In attendance: Kendall Gray, Kaleb Cartier, Matthew Harned, Eric Smead, Michael Maughan

Agenda

1. Go over what we learned at our Client Interview
2. Develop team understandings of project/deliverables from what we heard at our interview
3. Draft an email to Jonathan outlining our understandings of the project to clarify expectations

For the product specifications, we just need what we need to do at the end
Need to set up a target and marginal specification (ideal and alright)

We will need to discuss with SEL if they are ok with us rotating the device about the axis that is being vibrated on

We should be making sure that the device that we create actually attaches to the vibration table

We should get 3 concepts nailed down, and get things rolling as fast as possible, to make sure that we get as far as possible in the shortest amount of time.

Don't take ideas off the table until you are absolutely sure it is not going to work, or there is a clear solution

Make sure to document all ideas and the solutions, and put all into a decision matrix or something similar

We will also need to make sure that we have a plan for what the next prototype is going to be, with a better optimization, and plans to make sure that everything works much better than the first prototype

Chassis should be in tomorrow afternoon, and we can come by and pick it up

Action Items:

Schedule is due next week, and the specification document, but should be done asap
Ask Jonathan for the bolt pattern on the vibration tables
Bring idea list to the meeting next Thursday
set a goal to have a prototype before leaving for winter break
start getting components ahead of time so that we can start the coding and such

Matthew's office is GJ113

9/25/2018

Tuesday, September 25, 2018 5:22 PM

In attendance: Kendall Gray, Kaleb Cartier, Eric Smead

Started the product requirements document

9/26/2018

Wednesday, October 10, 2018 9:51 AM

In attendance: Kendall Gray, Kaleb Cartier, Eric Smead

Worked on Product Requirements Document together.

9/27/2018

Tuesday, October 2, 2018 3:47 PM

In Attendance: Kendall Gray, Kaleb Cartier

Product Requirements Document

Scope - defines everything that we are talking about within the document; putting bounds on what it does and where it lives; everything you have control over

Objective - goal

Appearance - able to be painted SEL blue

120V AC → Buy a DC Power Supply

How are we going to measure all these requirements to verify that we meet all of them

- Matrix to verify

- Metric → Number that comes from a test

- List in PRD → Summary table at end

Team Picture → Not a priority right now

Email Sally to see if she can bring a device by

Pick the design that will help you be most successful in your main goal

Go with two parallel paths

- One for the static

- One for the dynamic

Start running with the static portion and simultaneously work on the dynamic

Try not to totally reinvent the wheel

- Find something that we know works and go with it

Get serious about a quick and dirty test

What kind of failure modes will go into this?

- Components in the display

- Anticipate what may fail and take precautions to keep parts from failing

- dFMEA

Logbook - don't write a diary

10/4/2018

Thursday, October 4, 2018 11:10 AM

In Attendance: Eric Smead, Michael Maughan, Kaleb Cartier

see 10 problems with our design before talking to SEL about it

For prototyping, we should talk about whether or not we should buy digital scales, or cheap sensors, or if we feel confident enough, going out to buy the expensive sensor

We need to include brainstorming ideas in the portfolio, and everything else that we already have. Just leave it in the OneDrive folder

Make sure to have the measurability of each item in the PRD

For the portfolio, we need the team meeting notes, the schedule, PRD, brainstorming, budget, team contract

For the next SEL meeting, we should have a pseudo presentation on the stuff that we understand/have figured out

10/2/2018

Wednesday, October 10, 2018 9:51 AM

In attendance: Kendall Gray, Eric Smead, Kaleb Cartier

Started 11:30am

- Things we need to started doing:
 - Designing
 - Prototyping
- Decided solution: **Measure x and y coordinate, tilt table, measure z coordinate**
- Password for SEL sharing website: [GoVandals1](#)
- Discussed what we will talk about in next instructor meeting
 - Report/discuss our design solution
 - Plans for starting to prototype
 - Ask how we should compile Portfolio due that day
 - Draft an email to Jonathan/Sally
- New Action Items to add PRD soon
 - Most has already been updated

Ended 12:15pm

10/8/2018

Wednesday, October 10, 2018 9:52 AM

In attendance: Kendall Gray, Eric Smead, Kaleb Cartier

Started 2:30pm

Prepared for Snapshot

- Came up with value proposition:
 - "The device will provide more information during the vibration for possible points for failure, and thus improve the quality of future SEL products."
- Will send my Product Requirements Table file to Kendall
 - Word Online couldn't merge cells in a table so I had to do it on my computer
- Need to pick up a table at 10:00am tmrw for the Snapshot
- Dress in formal clothes

Portfolio due Thursday:

- Still need to fix up PRD
 - Will do it on Wednesday

Ended 3:05pm

10/10/2018

Wednesday, October 10, 2018 9:34 AM

In attendance: Kendall Gray, Kaleb Cartier, Eric Smead

We discussed the new information from the engineer that wrote the project. Kaleb spoke with him last night, and it appears that our ideas may be partially moot. We need to have a meeting very soon with all the folks from SEL to make absolutely sure that we are crystal clear on what SEL is desiring to have done.

We finished up our team documentation, and will need to maybe create some new design ideas.

The new stuff that came up last night will need to be discussed with Maughan to make sure that we are approaching the ideas correctly, and how exactly to deal with SEL, and make sure that everything is done to specification.

10/11/2018

Thursday, October 11, 2018 10:56 AM

Meeting 1:

In attendance: Kaleb Cartier, Kendall Gray, Eric Smead, Michael Maughan

If we are vibrating at 150Hz, Nyquist theorem states that we should get 3x the frequency of measurement, but it is a concern if we don't get enough information if we just stay at that, so if we do 1.2kHz, we could get it. If we multiply by a minimum of 6 sensors, we need an absolute minimum of 7.2kHz just to read the sensor data, and a minimum of 7 pins.

The clock cycles for the computation is going to be unknown and variable for the types of data, compression done by the coder, and such.

We probably will need to measure the maximum force, and correlate to the frequency when the device is at its lowest position (force and position are 180 degrees out of phase)

Get board information from Kendall

We need to set up a meeting ASAP with SEL to make sure that we know what we are doing moving forward

Dr. Maughan is available after 1130, but earlier is better, but doing it without someone there is fine. 1230 would be the best time.

Meeting 2:

In attendance: Kaleb Cartier, Kendall Gray, Eric Smead

Going over the math from the statics of each design, and preparing for the meeting with SEL at 230 on Friday, October 12. We also came up with Design 6, which may be the best of all of the designs, and may make all of the previous issues moot.

10/12/2018

Thursday, October 11, 2018 4:42 PM

Questions for SEL Meeting 2:

1. What information are you wanting? Shear and moment at the ears? Or just COG? (GUI issue)
Priority is CG, but they would like to have the moment and shear. They would like the stress measured at the mounting point, and the shear and the moment.

They want the natural frequency of the entire product. If we get the information at the ear, we should be able to get that.

We need to start taking a look at actually taking the measurements ASAP. Just try to get something in 2-axis. !!!!

They understand that there will have to be multiple measurements.

They really want to get the COG now....

They would like Cartesian

Can print out serial data to a LCD, and can spit out a data

We would like to do 8x maybe for the frequency of the sampling, but the strain gauges cannot be

Vibe tables to a constant acceleration on

Accelerometer readings are what they have right now, and this project will continue to help them get the natural frequency

They have a little handheld for the M71 Digital Force Torque Mark-10!!!!!!! This is just an option, that might be better for the final design, and might be better for SEL. Take a look at it. Would be really nice for SEL

Figure out where our origin will be, and make that consistent.

2. Why do they need the COG, and how does that help for the dynamic test? What are they looking for?

3. We need to verify that the server rack mount is 19 inches across, and has 12-24 thread
Think that is correct

Issues with the Designs:

Design 1:

1. Added force on the device affecting the calculations

Design 2:

1. Complicated build

Design 3:

- 1.

Design 4:

- 1.

Design 5:

- 1.

Design 6:

1. Stability, especially under the vibration table

10/18/2018

Thursday, October 18, 2018 10:52 AM

In attendance: Kaleb Cartier, Kendall Gray, Eric Smead

We need to do some re-design before 3-D printing, including adding some bearings, to make sure that there is minimal deflection and friction

We will probably need to find linear bearings. Check to see if Moscow Building Supply has linear bearings

We may want to find/perhaps purchase some rods that may be used for the final product

We will need to look into how much force could be on the upright sensor, which would be theoretically 25 lbs

Make a note of what the possible new design is

known weights for calibration

Talk to Ankit Gupta, GJ SW corner of the second floor for weights

we could also do a known volume of water/something else, and work it out mathematically

Our Wikipage title will be 3-Axis Center of Gravity Measurement Device

We need to standardize an origin, and what we call the force sensors, possibly for the axis

10/24/2018

Thursday, December 6, 2018 10:22 PM

In attendance: Kendall Gray, Kaleb Cartier, Eric Smead

Went over major schedule events for following months

- Need to schedule Design Review

- SEL either needs to be there, do a video conference call, or have us do one later at SEL

- Discussed tomorrow's meeting (see meeting agenda)

- Discussed what we will do regarding sensors

 - Current sensor we've been given only measures if force is applied, not the amount of force applied

 - Cheapest sensors that we know for sure can measure amount of force applied are \$86

 - For the sake of testing prototypes, we probably don't need to buy 4 sensors; can just reorient two sensors we buy

Started working on Project Value Proposition

- No template on Capstone website, so we looked over lecture slides and elaborated on what we already had was stated at the Snapshot what our value proposition was (see shared files)

10/25/2018

Thursday, October 25, 2018 11:11 AM

In attendance: Kendall Gray, Kaleb Cartier, Eric Smead, Michael Maughan

Discussed the issues with the 3-D printer. We also may want to print our design thinner, and with holes in it to save material.

We will be buying 4 cheap sensors to start finishing the prototype.
(Coding and sensor calibration needs to be done soon)

The math for finding the z-axis without tilting will not work. Figured that out after simplifying

We need to bring the value proposition to around 40 words

For future prototypes, we will need to start making it more aesthetically pleasing. But for now, we are doing well for getting started.

We should have two full designs that work for the design review

We need to make sure that the sensors can cope with having 40G's? on them. Verify the amount of extra force that the sensors are going to have to deal with

We need to start working on a list of short term goals

10/30/2018

Thursday, December 6, 2018 10:23 PM

In Attendance: Kaleb Cartier, Eric Smead, Kendall Gray

Set up Table Prototype gcode to 3D print later

Discussed meeting with SEL on Wednesday at 3:30pm

Sensors will not be in until Wednesday, and may not even be in ME office until Thursday

Will check if we can go pick it up ourselves

Kendall is creating a small presentation

Discussed my concerns with the Arm Prototype's design

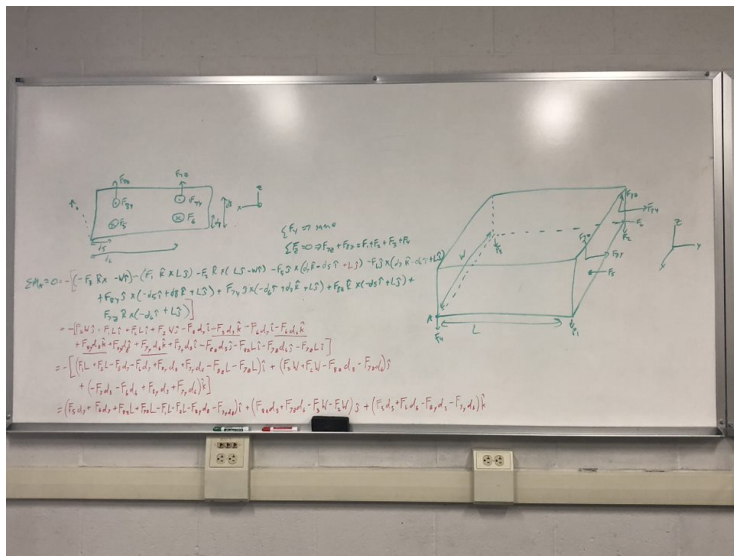
My concerns:

Seems like the reaction forces need to be known since this is a 3D design, i.e. cannot take moment about a pin without needing to find forces at another pin

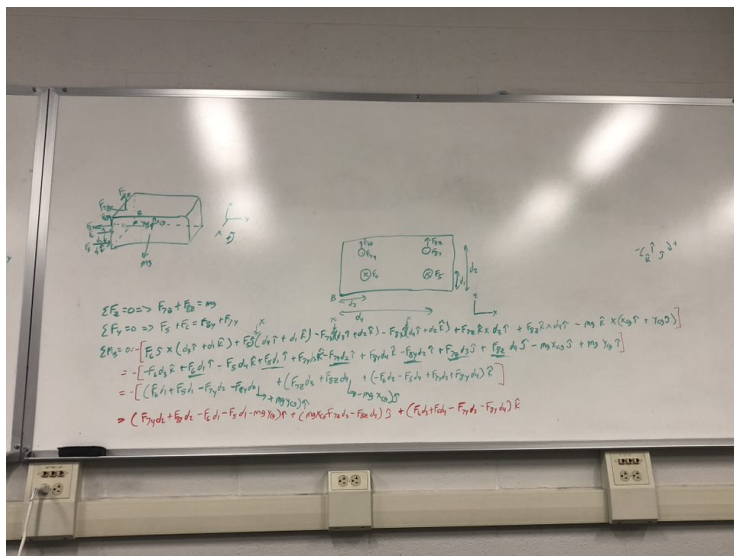
Thus, the reaction forces affect the sensor readings in an unknown amount

Fact that it is 3D was also giving Kaleb trouble for coding sensors

Spent a few hours trying to figure out if math in 3D could help us (shown below)



Top Piece



Arm

Appears that summing moments in 3D will allow us to find reaction forces, but we will likely need another sensor

10/31/2018 SEL Update

Wednesday, October 31, 2018 3:54 PM

Jonathan seemed to like the prototype we have
Math is complicated!

Temperature is going to be a problem

Ambient air temperature changes

Rogue sensor that only calculates temperature

→ another force sensor / strain gauge

→ temperature sensor

How far of a deviation is 10% accuracy?

If we can get to 10%, POC is done.

1% of 19" → rack size → 0.19"

Why do we have 4 sensors?

Week after Thanksgiving is the earliest

Week of 26th - Nov ← email Jonathan
to set up date

~~or week after~~

This Week!

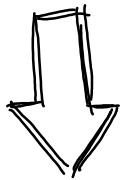
Maybe Thur
or Fri. 11/

no less than 15 people in the room

- one is the VP - Joe

- maybe the Chief

- asks hard questions



Gives u
to edit +

Would love to see a measurement!

Goal to have this done for presentation

Introduce project 1st

- Problem

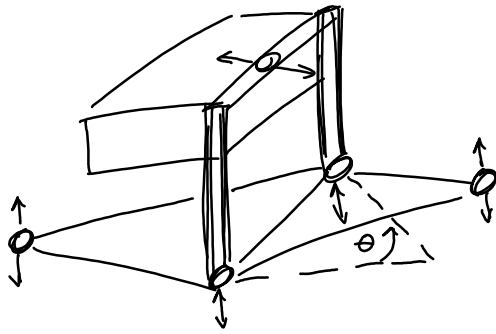
- why it is important to SEL

Get an outline done this week *

Send PPT +
Jonathan be-
Data At le

Open an account...

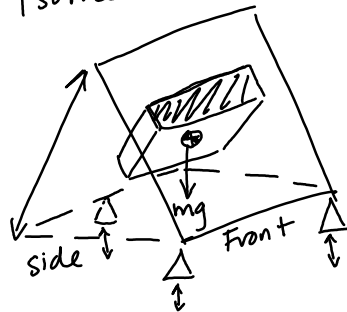
date ...
a week..



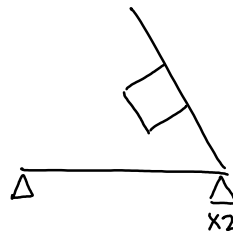
Multi axis sensor?

New Design?

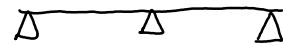
Isometric



Side



Front



Would be happy w/ getting the CG
w/ two separate measurements.

This is a very complicated project
even w/o the vibration table

11/2/2018

Thursday, December 6, 2018 10:25 PM

In Attendance: Eric Smead, Kendall Gray

Kendall and Eric met to go over the math for Prototype 3

- Eric first showed Kendall the design I made last night

- Spent the next 2 hours working on math for design

- Read over "Four Load Transducer CG Measurement" research article to find useful info

- Helped us figure out how to solve for z-axis CG coordinate

- Difference in our design is that there is a reaction force we can't solve for using our current design

- (Prototype 3 v.1)

- May want to redesign in order to get rid of reaction force at hinges

11/5/2018

Thursday, December 6, 2018 10:26 PM

In Attendance: Kendall Gray, Eric Smead

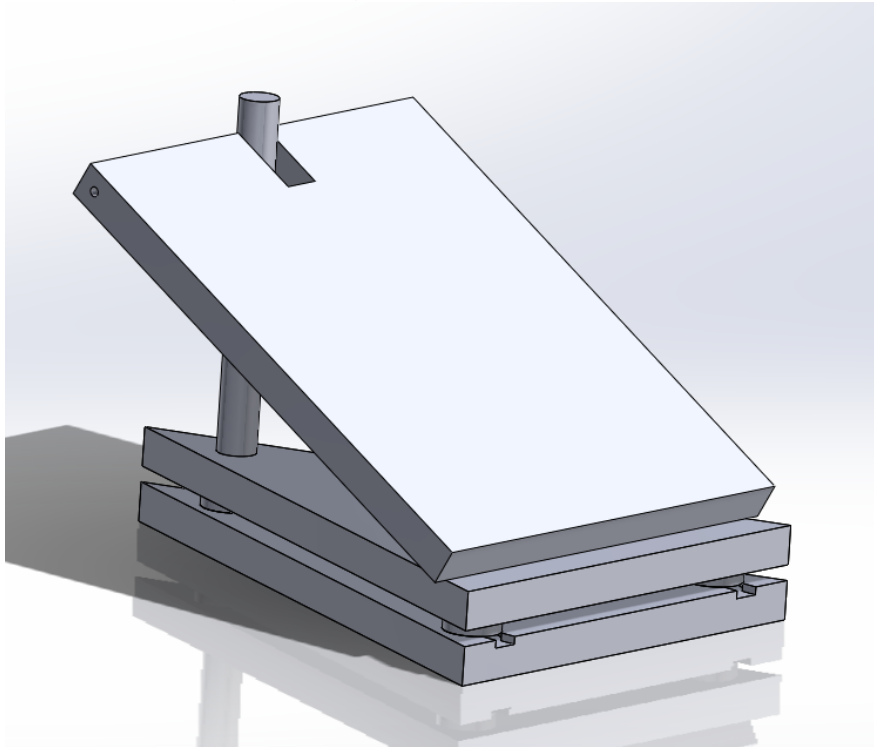
Went over Prototype 3 v.4 design

Discussed how to use linear actuators to raise angled plate

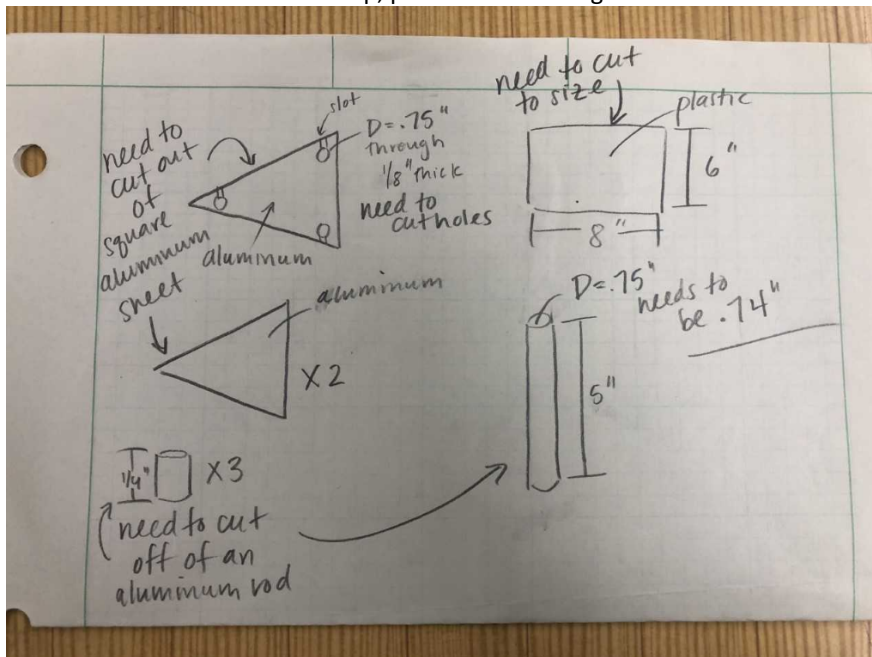
Decided to build a simpler, non-automated Version 5 to show our math works

Plan on showing this at Design Review

Kendall and I came up with design shown below



Gathered materials from the shop, plan and machining them as shown below



Need to wait until tomorrow to get Matthews help to actually build the prototype

11/7/2018

Thursday, December 6, 2018 10:27 PM

In Attendance: Eric Smead, Kendall Gray, Kaleb Cartier

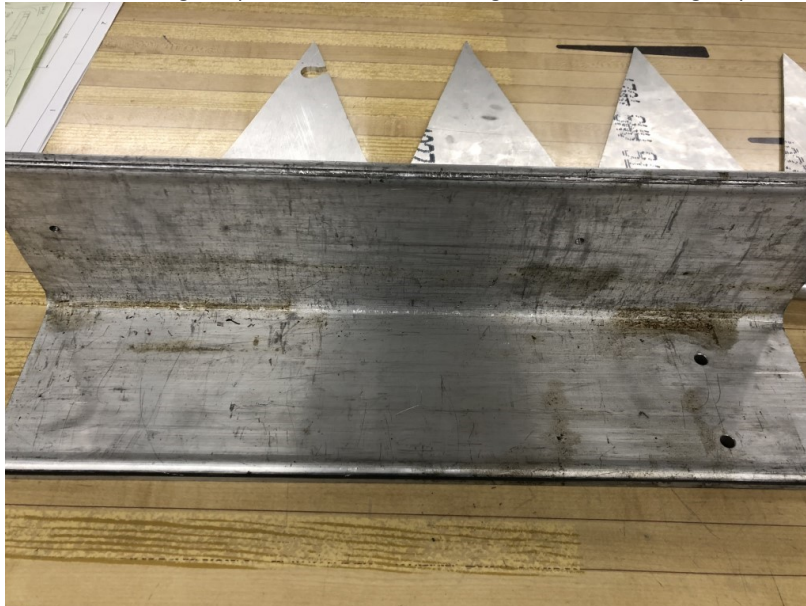
Went over design with Matthew and edited it slightly so that it is actually machinable in the shop

Worked in shop with Matthew until 3:30 when he had class

Machined these four pieces to put together and serve as the base for the design



Plan on machining this piece below to use as hinges that hold the angled plate when it's tilted



Hope to be done with prototype by Friday

11/8/2018

Thursday, November 8, 2018 11:06 AM

In attendance: Kendall Gray, Kaleb Cartier, Eric Smead, Michael Maughan

We may want to go back to cardboard and stuff like that for any future designs. For this particular project, we will continue on the same path, so that we are not falling behind

We do not need to have the double thickness on the aluminum table anymore.

Thursday 29th at 3pm SEL meeting

We need to meet at 2:30 the Monday before the Design Review to make sure that we have our presentation put together well

We may want to look into spherical joints for the final project

11/13/2018

Thursday, December 6, 2018 10:29 PM

In Attendance: Kaleb Cartier, Kendall Gray, Eric Smead

We worked the past several days in the shop to finish up the prototype, shown below

Kaleb's laptop fried which will set us back on testing, we will likely not have any done by the practice Design Review this Thursday

Action Items:

Each of us will work on the slides we will be presenting and a general script for when we present them, Kendall will format them

Plan on meeting on Thursday morning to practice presentation, as well as practice in instructor meeting

11/28/2018

Saturday, December 8, 2018 1:25 AM

Meeting with Johnathan and Sally about the presentation tomorrow

Make sure to mention Jonathan/Sally/Maughan/Matthew on Intro slide
Slide 2: make sure that they know that they are going to take the information into solidworks

Maybe put what we are going to say in the comments section while we email around

Product requirements: make sure to know how they are going to get that information out. make sure to explain the 160 accuracy as the accuracy of the 19 in span. change the percentage out of electrical. Look into the sample rate requirement. * mention what the sample rate for the stretch goal *

Research: make sure to put the full citation. Try to get a measurement for proof of concept. Maybe move up some of the other researched items.

Preliminary Designs: make sure to know which ones that we did math on or not. Put a blank text box over our final design.

Star Wars jokes are totally fine.

Learning the hard way: make sure to explain why it doesn't
Decision matrix was good to add in. The decision matrix needs to be minimized so that we don't have extra designs that we haven't talked about. Bring the AT-AT back to 0. make sure to fix transitions.

A New Hope: show where the sensors will be and such with arrows. Do not
physical content. Try to have a photo ready as

rely on having it well because there will be a lot of people remotely watching Electrical Design. Show scale of things. Try to put the system diagram (block diagram) that shows how the entire system comes together

Explain the uncertainty analysis before the slide with the accuracy percentages. Also make sure to quantify is a physical dimension. change title to predicted accuracy

make sure to add in the FSR in lessons learned. mention the increased accuracy for scaled up design

shoot 20-25 slides for a 30 min presentation. Try to only talk for 1 min per slide

SHOW THINGS

transitioning through more slides is better

Don't B.S.

12/12/2018

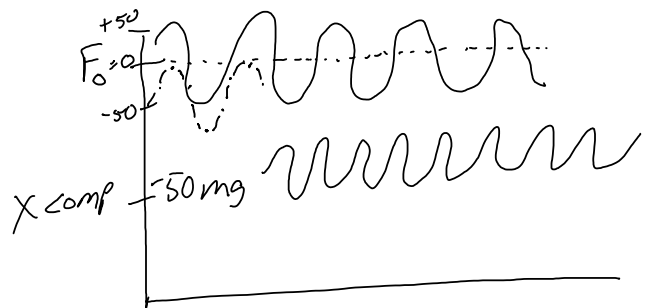
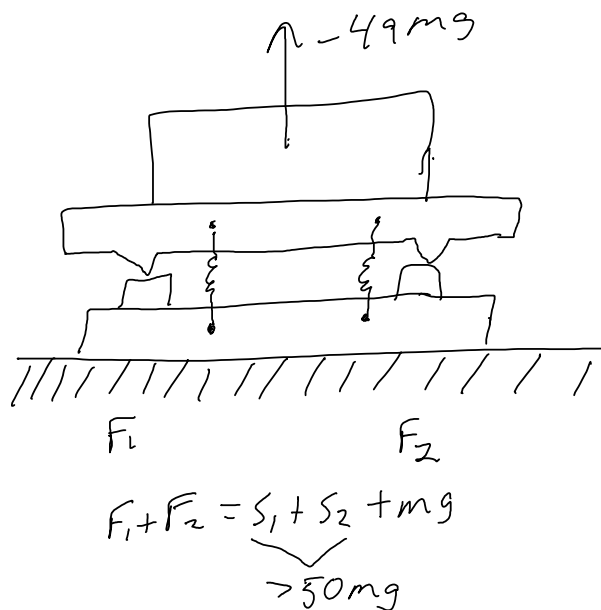
Wednesday, December 12, 2018 3:42 PM

In attendance: Kaleb Cartier, Kendall Gray, Eric Smead, Michael Maughan

Went over the reviews from SEL design review

Kendall will be doing some testing at home, and Kaleb will be working on re-designing the prototype, and making sure the math and the code works.

Dr. Maughan's design idea for dynamic



Moving down, we would only be reading about 1G, but moving up, we would be reading over 100G's. We need to see if there is a sensor that is able to handle both extremes.

There is a load cell that may be able to handle this that is down the hall from the NIATT room.

Perhaps look back into accelerometers

The model of the 5000lb load transducer is 1210-AF. Need to look and see if it can do compression and tension.

For the design review on January 29th, we need to have the final design, more so that we can build it, and make sure that we have anything new in electronics and such.

Action Items for Break

Kendall

- ☐ Work on updating Gantt Chart so it is chronological
- ☐ Testing with bathroom scales

Eric

- ☐ Update Wiki Page
- ☐ Update budget

Kaleb

- ☐ Recreate base for Star Destroyer
- ☐ Test with Star Destroyer 2.0
- ☐ Get a profile photo to Eric for Wiki Page

1/10/19

Thursday, January 10, 2019 3:09 PM

In attendance: Kaleb Cartier, Kendall Gray, Eric Smead

Started 2:00pm

- Discussed Kendall's Testing Prototype made over Winter Break
 - The testing prototype can calculate X, Y, and Z within ~5% if the object being measured flipped onto another face to calculate Z
 - It cannot calculate Z accurately if the prototype is tilted rather than object being reoriented
 - We believe this is because bathroom scales simply aren't designed to read forces when tilted to an angle
 - This prototype still provides a proof of concept in terms of measuring X and Y
 - Two objects with known CG coordinates were measured (shown below)
 - This testing prototype may actually work as a usable prototype for the project requirements if we can solve the problems with calculating the Z coordinate
- Went over what we need to have done before our February SEL Design Review:
 - Have a prototype that produces results:
 - X and Y measured within 5%
 - Z measured within 10%
 - Does not need to be automated
 - Uncertainty analysis for presented prototype and report of what we need to change in the design to meet the 1.0% accuracy requirement
 - Report of how we plan to design/create the final device
 - Prediction of problems we may run into while creating the final device
- Action Items:
 - Kaleb will work further on the current prototype to have it ready for testing
 - Eric will complete the wiki page descriptions
 - Eric will talk to Dr. Wolbrecht about our plans for uncertainty analysis and get his input, as well as read up on the Monte Carlo method
 - Kendall will work further on solving the issues with the Testing Prototype
 - Have another group meeting on Monday

Ended 3:15pm

1/14/19

Monday, January 14, 2019 10:59 AM

In attendance: Kaleb Cartier, Kendall Gray, Eric Smead

Started 10:35pm

- Discussed changes Kendall made the testing prototype
 - Improved the testing prototype by adding clay and PVC pipes to keep the scales in one orientation even when the table is tilted
 - There are still problems with the accuracy of the Z coordinate measurement, but we predict this is due to a math error
- Discussed Kaleb's progress of the Star Destroyer prototype
 - It is mostly ready for testing and will be with a few more tweaks

Ended 11:00am

Action Items by Thursday at 3:30 pm

Eric -

- ☐ Meet with Dr. Wolbrecht Tuesday at 2 pm
- ☐ Wikipage updated by Monday
- ☐ Start reworking uncertainty analysis
 - ☐ Calculate the accuracy of the sensors that is needed to get the CG accuracy we want
 - ☐ Incorporate uncertainty in CG from actual

Kaleb -

- ☐ Finalize electronics setup/wiring/code
- ☐ Testing

Kendall -

- ☐ Get Z equation nailed down for testing prototype
- ☐ Prove that it works

1/17/19

Thursday, January 17, 2019 3:35 PM

In attendance: Kaleb Cartier, Kendall Gray, Eric Smead, Michael Maughan, Matthew Harned

Started 3:30pm

- We showed Dr. Maughan and Matthew where the SD prototype is at and discussed Kaleb's plans
 - Kaleb just needs to calibrate and we will start getting measurements
- Kendall explained testing that she's been doing with the testing prototype
 - She placed it in several positions on the measuring table to see if she could find a pattern in the inaccuracies of the z coordinate measurements
 - So far she has found that the z coordinate inaccuracy increases as the object moves up the table
 - She plans on revisiting the equations for the testing prototype
- Eric reported what he's worked on in the uncertainty analysis
 - The Monte Carlo method reported a lower uncertainty to the z coordinate uncertainty, but the x and y coordinates were reported the same as the traditional uncertainty analysis method
- Action Items:
 - The team will meet up and finish the Expo registration form together
 - Eric will finish updating the wiki
 - Kaleb will finish calibration of the SD prototype
 - Kendall will continue working on solving the testing prototype's z coordinate issues

Ended 4:40pm

1/24/19

Thursday, January 24, 2019 4:53 PM

In attendance: Kendall Gray, Eric Smead, Michael Maughan

Started 4:00pm

- Dr. Maughan suggested we use a type of aluminum beam instead of a plate for the final design
 - Can use 2x4's instead in non-final prototypes
- Eric pointed out hysteresis should be considered for uncertainty analysis
 - The only hysteresis involved will come from the sensors
 - The manufacturers will provide the hysteresis
- We discussed what to present in the Design Review
 - Current prototype and results
 - Plans for final design (both 3D models and engineering drawings)
 - Problems we predict
 - Equations (walk through them)
 - Data
 - Show plots (better than eqn.s)
 - Good plot example: accuracy vs length
 - What can we draw from the data
 - How we plan to implement these moving forward

Ended 4:45pm

1/31/19

Friday, February 1, 2019 10:49 AM

In attendance: Kendall Gray, Kaleb Cartier, Eric Smead, Michael Maughan

Started 3:30pm

- Kaleb reported the issues existing in the SD prototype
 - The voltage supply is not very steady, and there are many electrical factors
 - There is a rounding error being made during computation
- Kendall got the testing prototype working by accounting for forces along the bottom of the plate
- Dr. Maughan suggested getting a calibration block for tools so that we can measure an accurate "actual" CG when solving for error of measurements made by prototypes
- Action Items:
 - Meet tomorrow to discuss final design more
 - Kendall and Eric will work on the final design
 - Kaleb will see what progress can be drawn from the SD prototype

Ended 4:45pm

2/1/19

Friday, February 1, 2019 11:33 AM

In attendance: Kendall Gray, Kaleb Cartier, Eric Smead

Started 10:30am

- Decided on final design:
 - Linear actuator lifts front side of top plate
 - Back of top plate moves inward on roller bearings to prevent linear actuator from having to move more than one direction
 - Note: will require multiple voltage inputs, i.e. different potentially power sources
 - Kaleb will create a PCV for it later on to make it look neater
- Kendall will try to find linear actuator and linear bearing SW models so that they can be inserted into the design's SW assembly instead of having to be drawn as a part
- We have more questions now for SEL
 - What makes the size specifications 24 x 12 x 20?
 - What exactly does 1.0% accuracy mean to them? Positional, true error, etc.?

Ended 11:30am

2/21/19

Thursday, February 21, 2019 4:14 PM

In attendance: Kendall Gray, Kaleb Cartier, Eric Smead, Michael Maughan

Started 3:30pm

- We went over feedback pages for presentation
- Explained to Dr. Maughan what we have changed in the design
 - He expressed concerns with the hollow cylinder idea for mounting the sensors
 - It may be beneficial to sacrifice more accuracy for a safer mounting method that doesn't risk adding reaction force unknowns
 - Dr. Maughan showed us more options for sensors he found
 - I expressed concerns about the ball joints and whether they actually remove restriction of movement
- We may want to send a clarifying email to Jonathan about how he would like us to go about choosing sensors
- Dr. Maughan pointed out that we will likely be making heavy use of the shop in comparison to many teams so we need to schedule ASAP
- Dr. Maughan and Kaleb discussed how he will go about building the electronics setup
- Action Items:
 - Kaleb will look at more sensors
 - Kaleb will work at the microcontroller
 - Eric and Kendall will talk with Matthew about manufacturing the design
 - Eric and Kendall will check the UI Formula Car to see what ball joints are like

Ended 4:10pm

2/28/19

Thursday, February 28, 2019 4:54 PM

In attendance: Kendall Gray, Kaleb Cartier, Eric Smead, Michael Maughan

Products ordered

- Aluminum
- Got the linear actuator
- Ordered the bracket for linear actuator

***Sensors

- Can't find analog and threaded sensors
- Way too pricy
 - Cheapest is \$530 for one sensor
- Don't think we can use the USB port
- Still looking into USB port working
- We think we need a threaded sensor to get the design to work
 - 40% chance of USB working
- Need digital signal from sensor
 - USB doesn't do this
- Don't know what communication protocol RobotShop is using for sensors
- Pitch it to SEL, and ask for more money?
- Possibly do an "S-Beam" load cell
- Need a power supply

***Send email to Sally and Jonathan about sensor plan

Get schedule ironed out so we are all aware of what needs to be done.

3/7/19

Thursday, March 7, 2019 3:57 PM

In attendance: Kendall Gray, Kaleb Cartier, Eric Smead, Michael Maughan

Started 3:30pm

- Kaleb believes the SD prototype displays wrong coordinates because of a combination of noise and bad sensors
- We will meet with Matthew tomorrow to go over the drawings
- Kendall will be gone from Tuesday to Sunday the week after Spring Break so I will be in the shop a lot that week
- We should predict what we will need for testing the final design and acquire it now
- We can use the particle board as a known CG object for testing the sensors when they arrive
 - Kaleb will cut it at his house

Ended 4:00pm

3/21/19

Tuesday, April 16, 2019 5:18 PM

In attendance: Kaleb Cartier, Eric Smead, Michael Maughan

Started 3:30pm

- Eric made a progress report on the shop work
 - Dr. Maughan suggest heat treatment on the plastic to smooth it out very well if necessary
 - Lubricant or sanding go a long way too but nothing may even be necessary
- One of Kaleb's electrical components was back-ordered so he will look into when we can get it and see if there's an alternative if we can't get it soon
- Kaleb will bring the actuator tomorrow so I can get the dimensions

- Action Items:
 - Kaleb will continue working on the electrical design
 - Eric will continue working in the shop with Matthew

Ended 4:00pm

3/28/19

Tuesday, April 16, 2019 5:19 PM

In attendance: Kaleb Cartier, Eric Smead, Michael Maughan

Started 3:30pm

- Kaleb ran into an issue in that the Arduino can only read up to a volt difference of 5V but the sensor outputs 6V
 - We could use a converter or change the ground voltage
- Dr. Maughan had an idea for how to clamp the sensor track plate to the drill press and use it to drill the holes that attach to the vertical plate
 - The drill press plate has a lip that we could potentially attach a C-clamp to along with the sensor track plate
 - Eric will bring this up with Matthew tomorrow
- Planned scheduling for SEL presentation:
 - Monday at 3:30pm (have to leave at 2:30pm because we are supposed to arrive early)
- Action Items:
 - Kaleb will continue working on the electrical design
 - Eric will continue working in the shop with Matthew

Ended 4:00pm

4/4/19

Tuesday, April 16, 2019 5:19 PM

In attendance: Kendall Gray, Kaleb Cartier, Eric Smead, Michael Maughan

Started 3:30pm

- Electrical box:
 - We should judge what size the electrical box might be and make ~20% bigger
 - That should allow us to make the box without Kaleb needing to spend time getting dimensions
 - Add holes for:
 - LCD
 - Power in
 - Sensors/LA wire
 - Button
- Kendall's golf teammate can translate the Chinese data sheet for us
- We should take a video of us using the final design and put it in the middle of the presentation
 - This allows us to make sure that our demonstration (in this case by video) in the presentation works
- Can try to potentially get help from SEL if we send a succinct email summarizing the problems Kaleb is having
- Action Items:
 - Kaleb will finish the electrical design and his slides
 - Kendall will design the electrical box and print it
 - Eric will finish the budget and uncertainty analysis slides
 - Kendall and Eric will work on the remaining non-electrical slides

Ended 4:30pm

4/18/19

Thursday, May 2, 2019 10:34 AM

In attendance: Kaleb Cartier, Eric Smead, Michael Maughan

Started 3:30pm

- Kaleb believes the electrical work is going decently well
 - Dr. Maughan cautioned us about making sure we don't repeat the same mistakes by replacing parts if the circuitry was in fact the problem
 - Eric will be helping with testing over the next few days
- Got advice from Dr. Maughan about how to fix sensor track tilting
 - Use another set of plastic bars
 - Can either place them underneath the carts or on the side
 - Use something of the same width to test if something between the space will stop it from tilting

Ended 4:15pm